

FORM PTO-1390  
(REV. 9-2001)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

Az.2993

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)

10/018145

INTERNATIONAL APPLICATION NO.

INTERNATIONAL FILING DATE

PRIORITY DATE CLAIMED

PCT/EP00/05440

June 14, 2000

June 16, 1999

TITLE OF INVENTION

APPARATUS FOR JOINING SUBSTRATES TOGETHER

APPLICANT(S) FOR DO/EO/US Björn Liedtke, Joachim Gordt, Ulrich Speer, James Wise,  
Hans Gerd Esser

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☐ is attached hereto (required only if not communicated by the International Bureau).
  - b. ☒ has been communicated by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
  - a. ☒ is attached hereto.
  - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
  - b. ☐ have been communicated by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
14. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☐ Other items or information:

"Express Mail" Mailing Label Number EL649468121US  
Date of Deposit December 14, 2001

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner of patents and trademarks, Washington, D.C. 20231.

*Rosalie A. Centeno*

Rosalie A. Centeno

U.S. APPLICATION NO. (known) <b>10/018145</b> <small>(see 37 CFR 1.5)</small>		INTERNATIONAL APPLICATION NO. <b>PCT/EP00/05440</b>		ATTORNEY'S DOCKET NUMBER <b>Az.2993</b>	
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21. <input checked="" type="checkbox"/> The following fees are submitted: <b>BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):</b> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. . . . . \$1040.00  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO . . . . . \$890.00  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO . . . . . \$740.00  International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) . . . . . \$710.00  International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) . . . . . \$100.00  <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>				<b>CALCULATIONS PTO USE ONLY</b>          <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%; text-align: right;">\$ 890.00</td> <td style="width:50%;"></td> </tr> <tr> <td style="text-align: right;">\$</td> <td></td> </tr> <tr> <td style="text-align: right;">\$</td> <td></td> </tr> <tr> <td style="text-align: right;">\$ 36.00</td> <td></td> </tr> <tr> <td style="text-align: right;">\$</td> <td></td> </tr> <tr> <td style="text-align: right;">\$</td> <td></td> </tr> <tr> <td style="text-align: right;">\$ 926.00</td> <td></td> </tr> <tr> <td style="text-align: right;">\$</td> <td></td> </tr> <tr> <td style="text-align: right;">\$ 926.00</td> <td></td> </tr> <tr> <td style="text-align: right;">\$</td> <td></td> </tr> <tr> <td style="text-align: right;">\$ 40.00</td> <td></td> </tr> <tr> <td style="text-align: right;">\$ 966.00</td> <td></td> </tr> <tr> <td style="text-align: right;">Amount to be refunded:</td> <td style="text-align: right;">\$</td> </tr> <tr> <td style="text-align: right;">charged:</td> <td style="text-align: right;">\$</td> </tr> </table>		\$ 890.00		\$		\$		\$ 36.00		\$		\$		\$ 926.00		\$		\$ 926.00		\$		\$ 40.00		\$ 966.00		Amount to be refunded:	\$	charged:	\$
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Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).			
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total claims	22 - 20 =	2	x \$18.00
Independent claims	1 - 3 =	0	x \$84.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$280.00
<b>TOTAL OF ABOVE CALCULATIONS =</b>			\$ 926.00
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.			
<b>SUBTOTAL =</b>			\$ 926.00
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).			
<b>TOTAL NATIONAL FEE =</b>			\$ 926.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +			\$ 40.00
<b>TOTAL FEES ENCLOSED =</b>			\$ 966.00

a. ☒ A check in the amount of \$ 966.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \$ \_\_\_\_\_ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit to any overpayment to Deposit Account No. 02-1653. A duplicate copy of this sheet is enclosed. In the event there is any discrepancy in the amount sent herewith or at any time in the future please charge any additional fee, credit or overpayment to the above deposit account number.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

**ROBERT W. BECKER & ASSOCIATES**  
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Robert W. Becker  
 SIGNATURE

Robert W. Becker  
 NAME

26,255  
 REGISTRATION NUMBER

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Date of Deposit December 14, 2001

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*Rosalie A. Centeno*  
Rosalie A. Centeno, Secretary

In the Application of Björn Liedtke et al

Ser.No.: Not Yet Known (Based on PCT/EP00/05440 filed June 14, 2000 and German priority document 199 27 514.9 filed June 16, 1999)

For: APPARATUS FOR JOINING SUBSTRATES TOGETHER

Filed on: December 14, 2001

Assistant Commissioner for Patents

Washington, DC 20231

**PRELIMINARY AMENDMENT ACCOMPANYING PCT NATIONAL STAGE APPLICATION**

Sir:

Prior to examination, please amend the above-identified application as follows.

**IN THE SPECIFICATION:**

On page 1, immediately after the title, please insert the following heading:

--Background of the Invention--.

On page 2, line 17, please insert the following heading:

--Summary of the Invention--.

On page 5, line 10, please insert the following heading:

--Brief Description of the Drawing--;

On page 6, line 11, please insert the following heading:

--Description of Preferred Embodiments--.

On page 16, after line 18, please insert the following paragraph:

--The specification incorporates by reference the disclosure of German priority document 199 27 514.9 filed 16 June 1999 and International priority document PCT/EP00/05440 of June 14, 2000.

The present invention is, of course, in no way restricted to the specific disclosure of the specification and drawings, but also encompasses any modifications within the scope of the appended claims.--

**IN THE CLAIMS:**

Please cancel claims 1 - 22, and replace them with the attached claims 23 - 44.

Please also add the attached abstract.

Please substitute the proposed drawing Figure 1 for Figure 1 as originally filed with PCT/EP00/05440.

**REMARKS**

Claims 23 - 44 are pending in the application.

Appropriate headings have been added to the specification, and claims from the literal translation have been replaced by claims drafted in conformity with U.S. Patent practice. A one page abstract has also been added.

The application in its amended state is believed to be in condition for allowance. However, should the Examiner have any comments or suggestions, or wish to discuss the merits of the application, the undersigned would very much welcome a telephone call in order to expedite placement of the application into condition for allowance.

Respectfully submitted,



Robert W. Becker, Reg. No. 26,255  
for Applicant(s)

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( US REPLACEMENT CLAIMS - FOR PRELIMINARY AMENDMENT)

23. An apparatus for joining together at least two substrates,  
each of which has an inner hole, said apparatus comprising:

a pin that is adapted to said inner holes of said substrates,

wherein said pin is provided with at least two noses that are  
movable radially relative to said pin, and

wherein said at least two noses have linear outer surfaces upon  
which edges of said inner holes of said substrates can glide  
downwardly during movement of said noses toward said pin.

24. An apparatus according to claim 23, wherein said at least  
two noses keep said substrates spaced apart prior to a joining together  
process.

25. An apparatus according to claim 23, wherein said pin is a  
centering pin.

26. An apparatus according to claim 25, wherein said at least  
two noses are pivotably mounted on said centering pin.

27. An apparatus according to claim 23, wherein at least one  
biasing unit is provided for an outward biasing of said at least two  
noses.

28. An apparatus according to claim 27, wherein said biasing  
unit is provided with at least one spring.

29. An apparatus according to claim 23, wherein means are  
provided for exerting pressure upon said substrates for effecting  
movement of said at least two noses toward said pin.

30. An apparatus according to claim 23, wherein an actuating element is provided for radially moving said at least two noses.

31. An apparatus according to claim 23, wherein said at least two noses are embodied as lever arms.

5 32. An apparatus according to claim 30, wherein said actuating element is insertable between said at least two noses.

33. An apparatus according to claim 30, wherein said actuating element has a conical configuration.

10 34. An apparatus according to claim 30, wherein ends of said at least two noses that face said actuating element are rounded off.

35. An apparatus according to claim 27, wherein means are provided for varying said biasing of said at least two noses.

15 36. An apparatus according to claim 23, wherein a tapered element is disposed in said pin, and wherein said tapered element is movable counter to a biasing means.

37. An apparatus according to claim 36, wherein said biasing means is a spring.

20 38. An apparatus according to claim 36, wherein a biasing element is disposed between said tapered element and said at least two noses.

39. An apparatus according to claim 36, wherein an outwardly directed biasing of said at least two noses is variable via a movement of said tapered element.

40. An apparatus according to claim 27, wherein a tensioning element is provided for drawing said at least two noses inwardly, and wherein said tensioning element has a tensioning force that is not sufficient to overcome a normally outwardly directed biasing force of said at least two noses.

41. An apparatus according to claim 40, wherein when said outwardly directed biasing force of said at least two noses is reduced, said tensioning force of said tensioning element draws said at least two noses inwardly.

42. An apparatus according to claim 40, wherein said tensioning element is a spring ring that is disposed on said at least two noses.

43. An apparatus according to claim 42, wherein said spring ring is disposed on an inner periphery of said at least two noses.

44. An apparatus according to claim 23, wherein four noses are provided.

Fig. 1

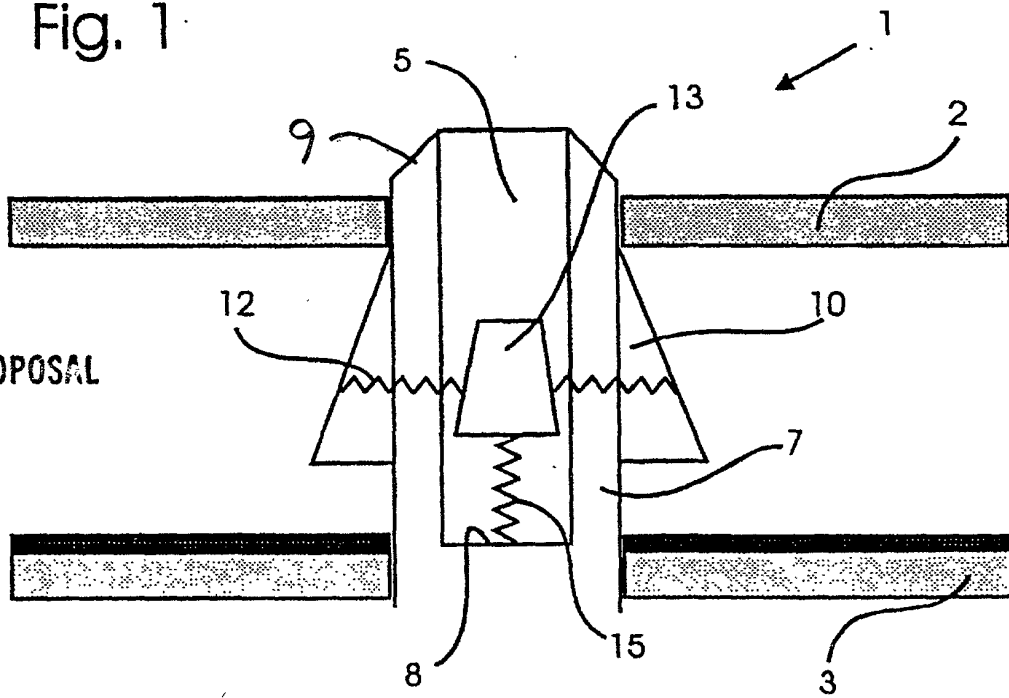
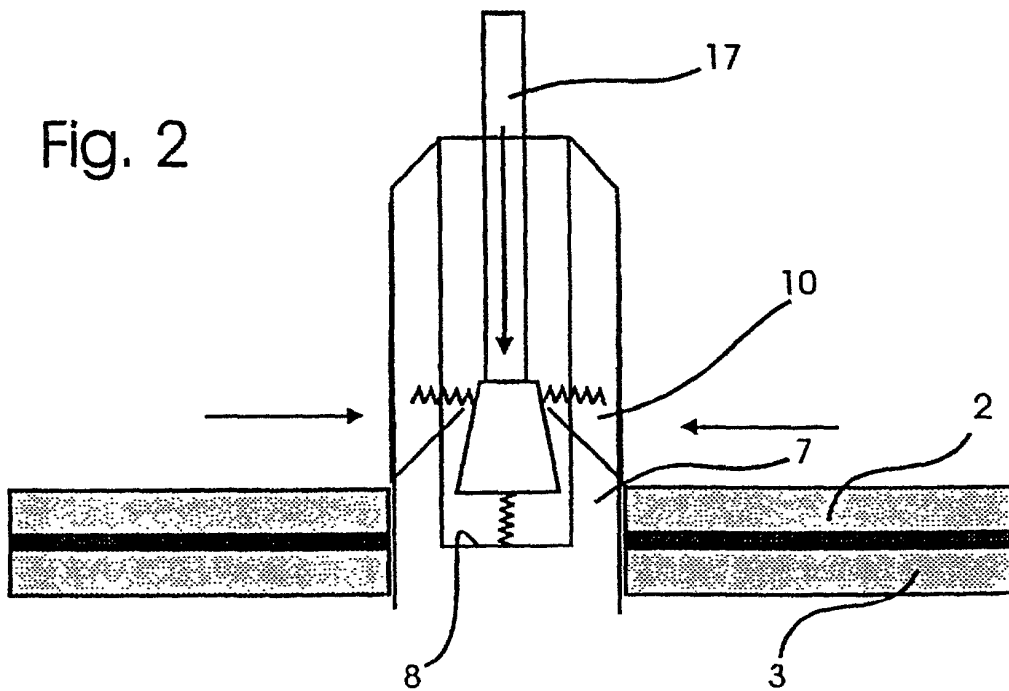


Fig. 2



DRAWING PROPOSAL

FOR "PATENT" 5418100



5/pst

Apparatus For Joining Substrates Together

The present invention relates to an apparatus for joining together at least two substrates, each of which has an inner hole, with the apparatus having a pin that is adapted to the inner holes of the substrates.

Many data carriers, such as DVD's, are generally comprised of two substrates that are glued together and that for the gluing are joined together in a centered manner. In so doing, generally a first substrate that is provided with an adhesive coating is placed upon a planar support and subsequently a second substrate is moved over the first substrate by means of a handling apparatus and hence the substrates are brought together. In this connection, the handling apparatus must not only be in a position to precisely orient these substrates relative to one another, but also to uniformly press the substrates together. However, such a handling apparatus is very complicated and expensive, and is susceptible to disruptions, which leads to irregularities during the joining together and adversely affects the functioning of the data carrier and can even make it unusable.

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inner holes of the substrates glide downwardly on the straight or linear outer surfaces of the noses during movement of the noses toward the pin. The pin makes it possible during the joining together for the substrates to be guided precisely centrally and parallel to one another. In particular, due to the linear outer surfaces of the noses, the substrates are held such that their faces are parallel to one another, and the linear outer surfaces, during the joining together, provide a constant movement sequence. Due to the use of the pin, the requirements made of a handling apparatus can be significantly reduced, so that the costs associated therewith are eliminated.

Pursuant to a particularly preferred specific embodiment of the invention, prior to the joining together, the noses keep the substrates spaced apart, so that they are placed upon the pin and can subsequently be transported into a joining station in which they are joined together. The pin is advantageously a centering pin, that at least in the lower region has an outer periphery that corresponds to the inner periphery of the inner holes of the substrates in order to precisely align the substrates relative to one another.

For a particularly simple and economical embodiment of the invention, the noses are pivotably mounted on the centering pin. The noses are

advantageously biased outwardly by at least one biasing unit in order to achieve a controlled joining together of the substrates. In this connection, the biasing unit is preferably provided with at least one spring.

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Pursuant to one specific embodiment of the invention, the noses are movable toward the pin by exerting pressure upon the substrates, so that the substrates can be joined together in a controlled manner by a simple exertion of pressure.

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Pursuant to an alternative specific embodiment of the invention, an actuating element that radially moves the noses is provided and can control the movement of the noses. For this purpose, the noses are preferably embodied as lever arms in order to enable a simple actuation thereof. The actuating element is advantageously introducible between the noses and has a conical configuration in order to enable a uniform movement of the noses in a simple manner. For a good gliding movement between the noses and the actuating element, the ends of the noses are advantageously rounded off.

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Pursuant to a further specific embodiment of the invention, the biasing of the noses can be varied in order to enable a controlled gliding of the

substrates along the outer surfaces of the noses. Advantageously, a conical or tapered element disposed in the pin is provided that is movable counter to a biasing. In this connection, the tapered element is preferably movable against a spring.

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In order to provide a controllable biasing of the noses, a biasing element is preferably provided between the tapered element and the noses. The outwardly directed biasing of the noses is in this connection preferably variable via a movement of the tapered element.

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Further features, advantages and details of the invention will be explained subsequently with the aid of preferred specific embodiments with reference to the figures, in which:

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Fig. 1 is a schematic cross-sectional view through a centering pin of the present invention prior to the joining together of two substrates;

Fig. 2 is a schematic cross-sectional view of the centering pin of Fig. 1 during the joining together of the substrates;

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Fig. 3 is a schematic cross-sectional view of the centering pin and a substrate handling apparatus for the removal of the substrates from the pin;

Fig. 4 shows a processing station for the joining together of two substrates, which station contains a centering pin of the present invention and in particular in an opened position;

Fig. 5 shows a view similar to that of Fig. 4, whereby the processing station is shown in a closed position prior to the joining together of two substrates;

Fig. 6 shows a similar view to that of Fig. 4, whereby the processing station is shown during the joining together of two substrates;

Fig. 7 shows a view similar to that of Fig. 4 of an alternative processing station for the joining together of two substrates.

Figures 1 to 3 show a first embodiment of a centering and holding pin 1 for receiving substrates 2,3. The pin is accommodated in a non-illustrated receiving means that defines a support for the substrates 2,3. A joining station, in which the pin can be inserted, is shown, for example, in the patent application belonging to this applicant and filed on the same day as the present application and having the title "Apparatus and Method for Producing a Data Carrier"; to avoid repetition, this referenced application is made the subject matter of the present application.

The pin 1 has an upwardly open hollow chamber 5, which is delimited to the side by a side wall 7, and toward the bottom by a base 8 of the pin 1. The outer periphery of the wall 7 is adapted to the shape of the inner or central holes of the substrates 2,3 and in particular in a lower region the pin is provided with a precisely ground outer periphery in order to ensure a good centering and guidance of the two substrates 2,3 relative to one another. The upper end of the wall is beveled, so that it defines an upwardly tapering inclined surface 9. The inclined surface 9 enables a centering and guidance of the substrates when they are received on the pin.

Disposed on the side wall 7 of the pin 1 is a plurality of projections or noses 10, two of which are illustrated in Figures 1 to 3. With the presently preferred embodiment, four noses 10 are provided. The noses 10 are pivotably disposed on the wall 7 of the pin 1 in a suitable manner in order to be pivotable between the positions shown in Figures 1 and 2.

By means of compression springs 12, the noses 10 are biased radially outwardly away from the pin 1 into the position shown in Figure 1, as will be described in greater detail subsequently. Provided in the hollow chamber 5 of the pin 1 is a conical or tapered element 3 that tapers

upwardly. The tapered element 13 is disposed within the hollow chamber 5 such that it is vertically movable and is biased upwardly via a spring 15 into the position shown in Figure 1. One end of the compression springs 12 is supported against the tapered element 13, and the other end of the compression springs is supported against the noses 10 in order to press them outwardly. In so doing, the springs 12 can glide along the conical surface of the tapered element 13, as a result of which the outwardly directed biasing force is altered.

A non-illustrated spring ring or lock washer extends about the lower ends of the noses in order to draw them to the pin 1 into the position shown in Figure 1. In so doing, the spring constant of the spring ring is so low that it does not exceed the outwardly directed biasing force exerted by the compression springs 12 as long as the tapered element 13, and hence the inner support of the springs 12, are in the position shown in Figure 1. If, as shown in Figure 2, the tapered element 13 is pressed downwardly by a rod 17, the springs 12 glide along the conical surface of the tapered element 13, as a result of which the outwardly directed biasing force of the springs 12 is reduced. In this position, the spring constant of the spring ring is sufficient to draw the noses 10 to the pin 1 into the position shown in Figure 2.



During the movement of the noses 10 between the position shown in Figure 1 and the position shown in Figure 2, the substrate 2 glides along the outer surfaces of the noses 10 in the direction of the substrate 3. In so doing, the linear surfaces of the noses 10 provide a good guidance of the substrate 2 which prevents a tilting or cocking of the substrate. This guidance is maintained during an essentially constant transmission of force until the substrate 2 rests upon the substrate 3.

The rod 17 can be part of a non-illustrated pressure ram that serves for pressing the substrates 2,3 together.

Instead of the above-described arrangement of compression springs 12 for pressing the noses 10 outwardly, and a non-illustrated spring ring for drawing the noses together, it would also be possible for the noses 10 to contact the tapered element 13 directly and to be pressed outwardly by the tapered element 13 in the position shown in Figure 1. If the tapered element 13 is moved into the position shown in Figure 2, the noses glide along the conical outer surface of the tapered element 13 and are drawn into the position shown in Figure 2 by the non-illustrated spring ring. The same effect could also be achieved if the springs 12 shown in Figure 1 were to be embodied as tension springs.

Figure 3 shows a substrate handling apparatus 20 for the removal of the joined-together substrates 2,3 from the pin 1. The handling apparatus 20 is provided with a spacer rod 22 for pressing the tapered element 13 down in order, prior to the removal, to move the noses 10 into their retracted position of Fig. 3. The handling apparatus 20 is furthermore provided with vacuum fingers 24, two of which are illustrated in Figure 3, by means of which the substrates 2,3 are drawn against the handling apparatus 20 and held thereon. The vacuum fingers 24 are displaceable in height relative to the main body 25 of the handling apparatus 20, for example by means of a bellows mechanism, in order to enable a relative movement, in terms of height, between the spacer rod 22 and the vacuum fingers 24.

A specific embodiment of the invention will be described subsequently with the aid of Figs 4 to 7, whereby the same reference numerals are used as in Figs 1 to 3 to the extent that they relate to the same or similar parts.

Fig. 4 shows a processing station 30 for the joining together of substrates 2,3 to form a DVD. The processing station 30 has a support member 32 as well as a processing chamber 34. The support member

is essentially formed by a main body 36 that defines a support for the substrate 3. As can be best seen in Fig. 7, the main body 36 has an upwardly directed surface 38 that, in a portion located below the substrate, is provided with a recess 39 in order when the substrate is placed on to form a chamber 40 between the substrate 3 and the main body 36. The chamber 40 is supplied with a pressurized fluid via lines 41, 42 in order during a joining process to exert an upwardly directed pressure against the substrate. By means of O-rings 45,46 disposed in the surface 38, the chamber is sealed off toward the outside, so that during the joining process, no fluid can escape from the chamber.

Formed in the central portion of the surface 38 is a further recess 47 in which a centering and holding pin 50 is accommodated. The pin 50 is provided with projections or noses 51 that are pivotably mounted thereon and that have linear outer surfaces 53. The pin 1 is provided with a shaft or extension 55 that is disposed radially inwardly relative to the noses 51; the extension extends from below between the noses 51 and in particular to the height of the pivotable attachment of the noses. Disposed between the noses and the extension are compression springs 56 that press the noses 51 radially outwardly. In so doing, the noses 51 form a conical shape that widens in a downward direction and upon which a substrate 2 can be placed. By means of the springs

56, the noses are pressed outwardly with an adequate force in order to hold the substrate 2 in the position shown in Fig. 4. In order to join the substrates 2,3 together, a pressure is applied to the substrate 2 from above by means of an apparatus that will be described subsequently; this pressure is sufficient to overcome the spring force and to effect an inward pivoting of the noses 51. In so doing, the substrate 2 glides along the linear outer surfaces 53 of the noses 51 and is precisely guided during the gliding movement, thereby preventing a tilting or cocking of the substrate 2. The substrate 2 is essentially guided until it comes into contact with the substrate 3 and is pressed together therewith.

The processing chamber member 34 has a housing 60 that defines a downwardly open chamber 62. The housing 60 and the support member 32 are movable relative to one another, whereby the housing can be positioned upon the surface 38 of the support member 32 in order to close off the underside of the chamber 62 in the housing 60. The chamber 62 can be vented via a line 64, so that a joining together process of the substrates 2,3 in the vacuum can be effected.

Disposed in the chamber 62 is a movable press or ram 65 that in a downwardly directed surface 67 is provided with a recess 68 in order to

form a chamber 70 between the ram 60 and the substrate 2 when the ram 60 is moved into contact with the substrate 2 as shown in Fig. 6. The chamber 70 is sealed off toward the outside and toward the inside by O-rings. In the same manner as the chamber 40, the chamber 70 can be supplied with a fluid in order during a joining process to press the substrate 2 downwardly against the substrate 3. Pressing the substrates together by means of a fluid introduced into the chambers 40,70 provides a uniform surface pressure against the substrates and thus ensures a good joining process.

A joining together of the substrates will now be explained with the aid of Figs. 4 to 6. As can be seen from Fig. 4, a first substrate 3 is placed upon the surface 38 of the support member 32, and a second substrate is placed upon the noses 51 of the pin 50, as a result of which a defined spacing is maintained between the substrates. The housing 60 of the processing chamber member 34 is spaced from the surface 38 of the support member 32.

As shown in Fig. 5, the housing 60 is subsequently positioned upon the surface 38 in order to form a closed processing chamber 62. The processing chamber is now vented via the line 64 in order to carry out the subsequent joining together of the substrates under vacuum

conditions. This prevents air pockets or bubbles between the substrates during the joining together.

5 The ram 65 is lowered until it comes into contact with the substrate 2, and the substrate 2 is then pressed downwardly by the ram 65, which is lowered further. In so doing, the edges of the inner hole of the substrate 2 are guided by the inwardly pivoting noses 51, thereby preventing a tilting of the substrate 2.

10 As soon as the substrate 2 has been lowered to such an extent that it comes into contact with the substrate 3, in particular with an adhesive layer disposed thereon, as shown in Fig. 6, a pressurized fluid is introduced into the chambers 40,70 in order to press the substrates 2,3 together in a controlled manner.

15 Instead of the joining together apparatus 30 described above, it is to be understood that another suitable apparatus can also be used in conjunction with the centering and holding pin. One example for another apparatus is described in the patent application that belongs to  
20 the same applicant and was filed on the same day and has the title "Apparatus and Method for Producing a Data Carrier", with this

application being made the subject matter of the present application in order to avoid repetition.

Fig. 7 shows a support member 32 of a processing station 30 pursuant to Figs. 4 to 7, whereby in addition an actuating element 74 is shown that is suitable for pivoting the noses 51 of the pin 50. The actuating element 74 is provided with a shaft 76, as well as with a conical or tapered element 78 secured thereon. The shaft 76 and the tapered element 78 can, of course, also be embodied as a single part. The tapered element 78 is provided with downwardly tapering surfaces 79 that can be introduced between the noses 51 of the pin 50, as indicated in Fig. 7. When the tapered element is introduced between the noses 51, it comes into contact with rounded end portions 80 of the noses 51 and presses these noses apart during a further downwardly directed movement of the tapered element 78. As a result, the noses, especially the linear outer surfaces 53, are pressed inwardly in the direction of the pin 50 against the outwardly directed bias of the springs 56. The tapered element can pivot the noses entirely inwardly in order to enable a movement of the substrates along the pin 50.

The actuating element 74 is, for example, associated with the ram 65 of Figs. 4 to 6 in order to enable a controlled placement of the

substrate 2. However, the actuating element 74 can also be associated with a substrate removal unit in order to permit a free removal of the substrates 2,3 from the pin 50 after the joining together.

5 The invention has been described with the aid of preferred specific embodiments of the invention, without, however, being limited thereto. In particular, the apparatus is usable not only for joining substrates together to form DVD's. The invention can also be used with an apparatus for coating or layering an optical carrier, as described, for  
10 example, in the patent application of this applicant that was filed on the same day as the present application and has the title "Apparatus and Method for Coating an Optically Readable Data Carrier". To avoid repetition, this other application is made the subject matter of the present application. Furthermore, the apparatus is also not limited to  
15 the joining together of two substrates. Rather, a plurality of substrates can also be joined together sequentially or also essentially simultaneously.



## Patent Claims

1. Apparatus for joining together at least two substrates (2,3), each of which has an inner hole, with a pin (1,50) that is adapted to the inner holes of the substrates, characterized in that the pin is provided with at least two noses (10,51) that are movable radially relative to the pin (1,50), wherein the edges of the inner holes of the substrates glide downwardly upon the linear outer surfaces of the noses during movement of the noses (10,51) toward the pin (1,50).
2. Apparatus according to claim 1, characterized in that the noses (10,51) hold the substrates (2,3) spaced apart prior to the joining together.
3. Apparatus according to claim 1 or 2, characterized in that the pin (1,50) is a centering pin.
4. Apparatus according to one of the preceding claims, characterized in that the noses (10,51) are pivotably mounted on the centering pin.
5. Apparatus according to one of the preceding claims, characterized by at least one biasing unit (12,56) for the biasing of the noses (10,51) outwardly.

6. Apparatus according to claim 5, characterized in that the biasing unit has at least one spring (12,56).
7. Apparatus according to one of the preceding claims, characterized in that the noses (10,51) are movable toward the pin (1,50) by exerting pressure upon the substrates (2,3).
8. Apparatus according to one of the preceding claims, characterized by an actuating element (13,78) that radially moves the noses (10,51).
9. Apparatus according to one of the preceding claims, characterized in that the noses (51) are embodied as lever arms.
10. Apparatus according to claim 8 or 9, characterized in that the actuating element (78) is introducible between the noses (51).
11. Apparatus according to one of the claims 8 to 10, characterized in that the actuating element (13,78) is conical.
12. Apparatus according to one of the claims 8 to 11, characterized in that that end of the noses (51) that face the actuating element (78) is rounded off.
13. Apparatus according to one of the preceding claims, characterized in that the biasing of the noses (10,51) is variable.

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14. Apparatus according to one of the preceding claims, characterized by a tapered element (13) that is disposed in the pin (1) and is movable counter to a biasing (15).
15. Apparatus according to claim 14, characterized in that the tapered element (13) is movable against a spring (15).
16. Apparatus according to one of the claims 14 or 15, characterized by a biasing element (12) disposed between the tapered element (13) and the noses (10).
17. Apparatus according to one of the claims 14 to 16, characterized in that the outwardly directed biasing of the noses is variable via a movement of the tapered element (13).
18. Apparatus according to one of the preceding claims, characterized by a tensioning element that draws the noses (10) inwardly, with a tensioning force that is not sufficient to overcome the normally outwardly directed biasing of the noses.
19. Apparatus according to claim 18, characterized in that the tensioning force of the tensioning element draws the noses (10) inwardly when the outwardly directed biasing is reduced.
20. Apparatus according to one of the claims 18 or 19, characterized in that the tensioning element is a spring ring disposed on the noses (1).

21. Apparatus according to claim 20, characterized in that the spring ring is disposed on the inner periphery of the noses (10).
22. Apparatus according to one of the preceding claims, characterized by four noses (10,51).

Fig. 1

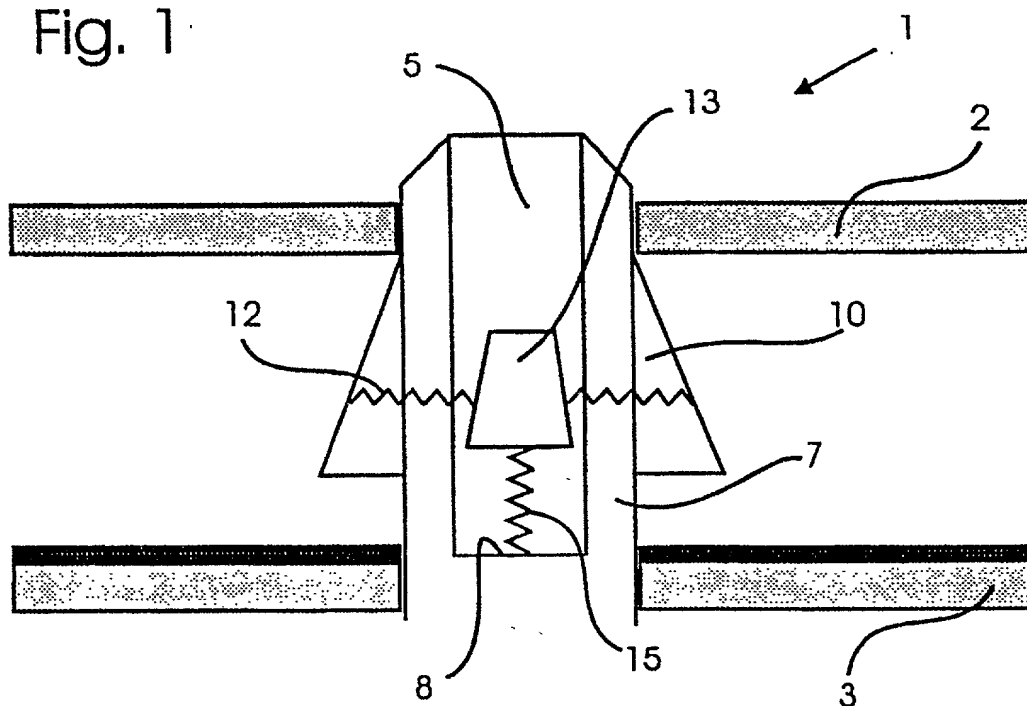


Fig. 2

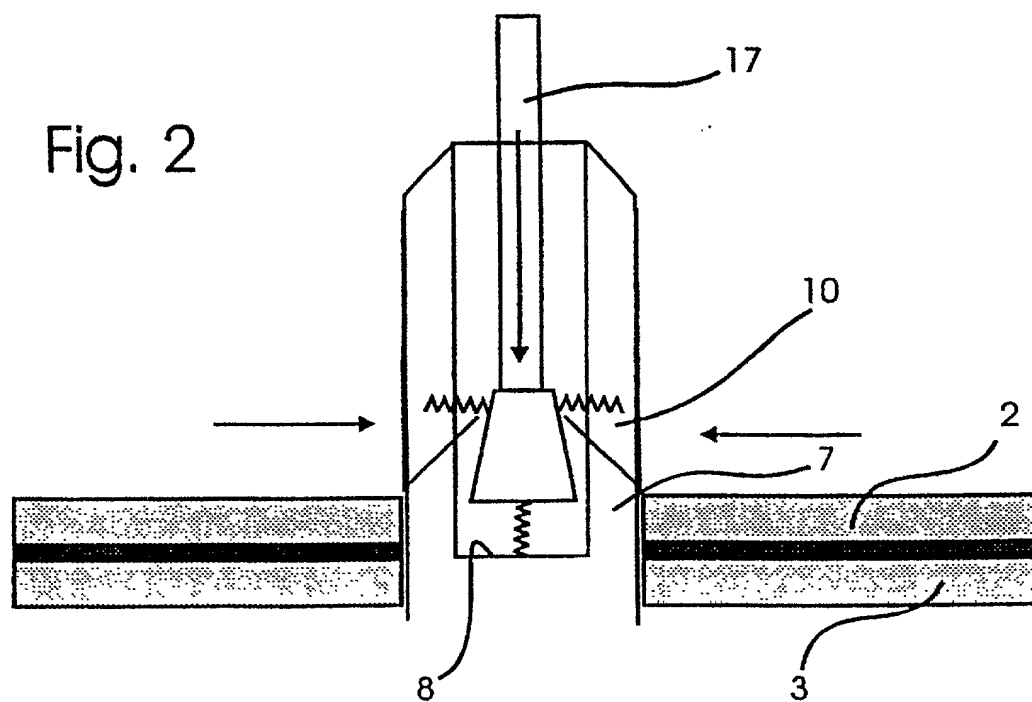


Fig. 3

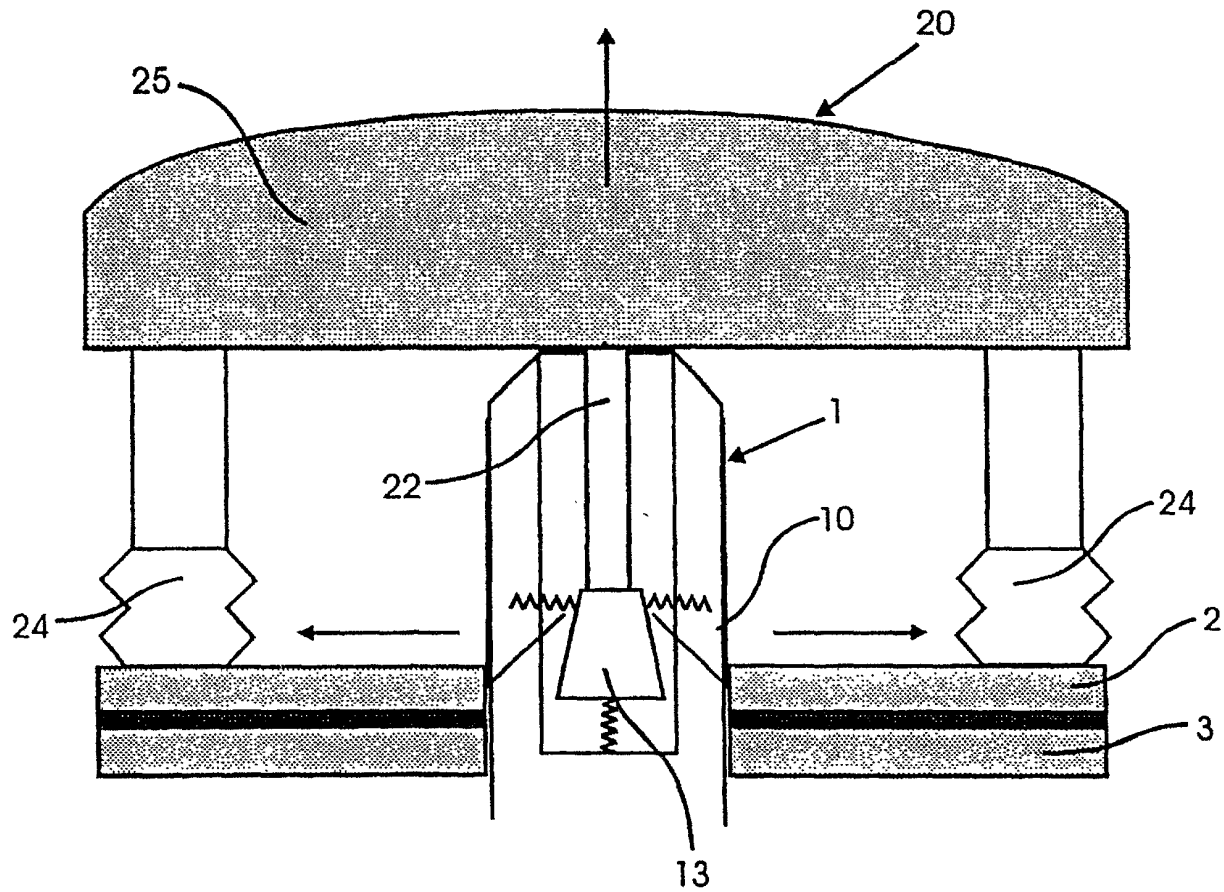
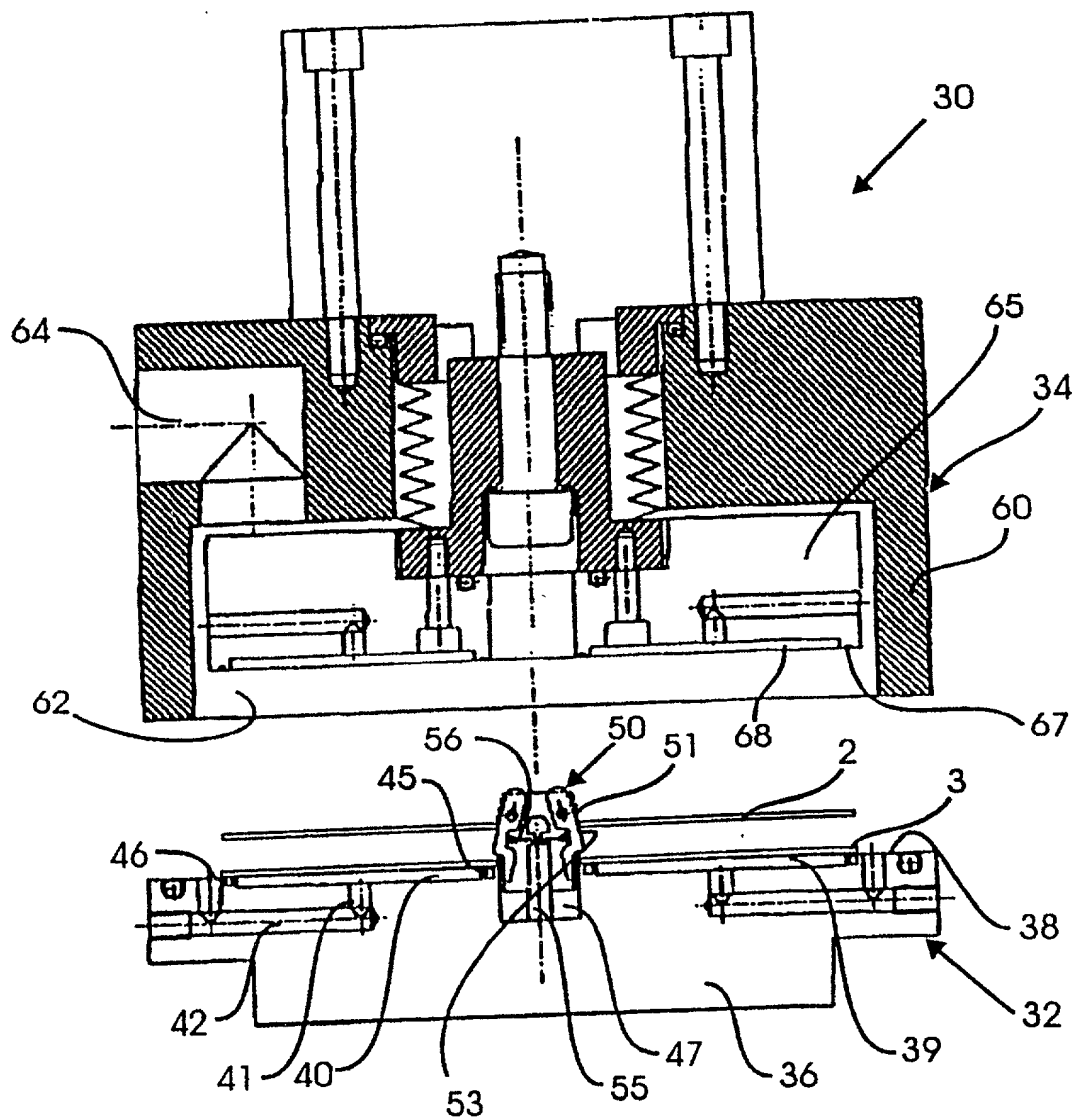


Fig. 4



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Fig. 5

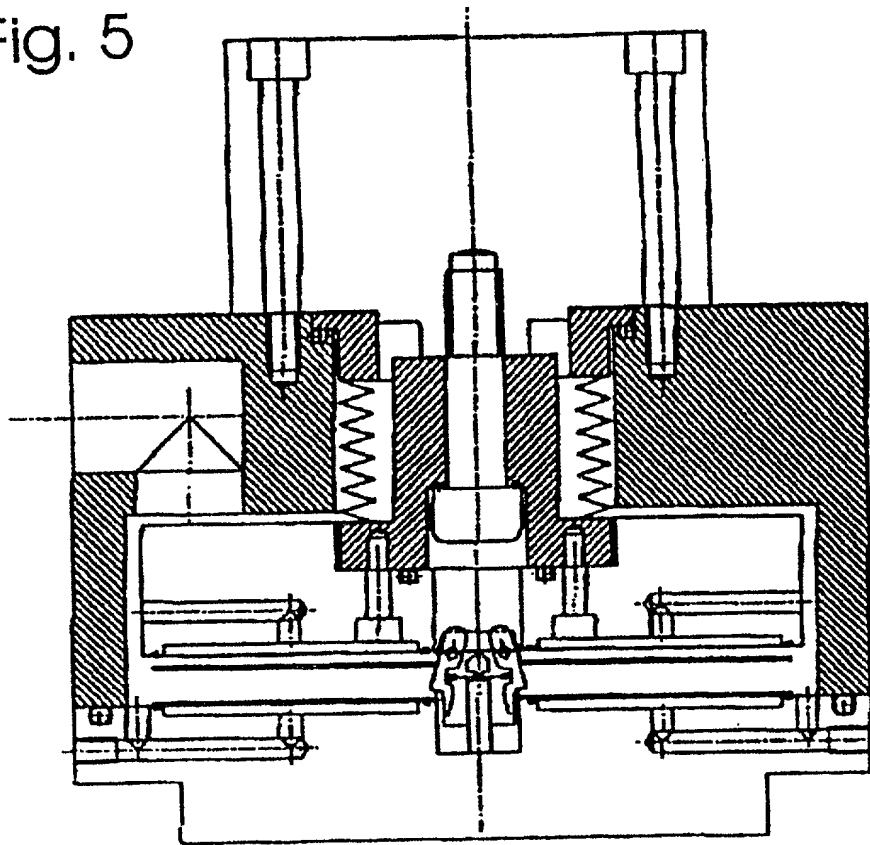


Fig. 6

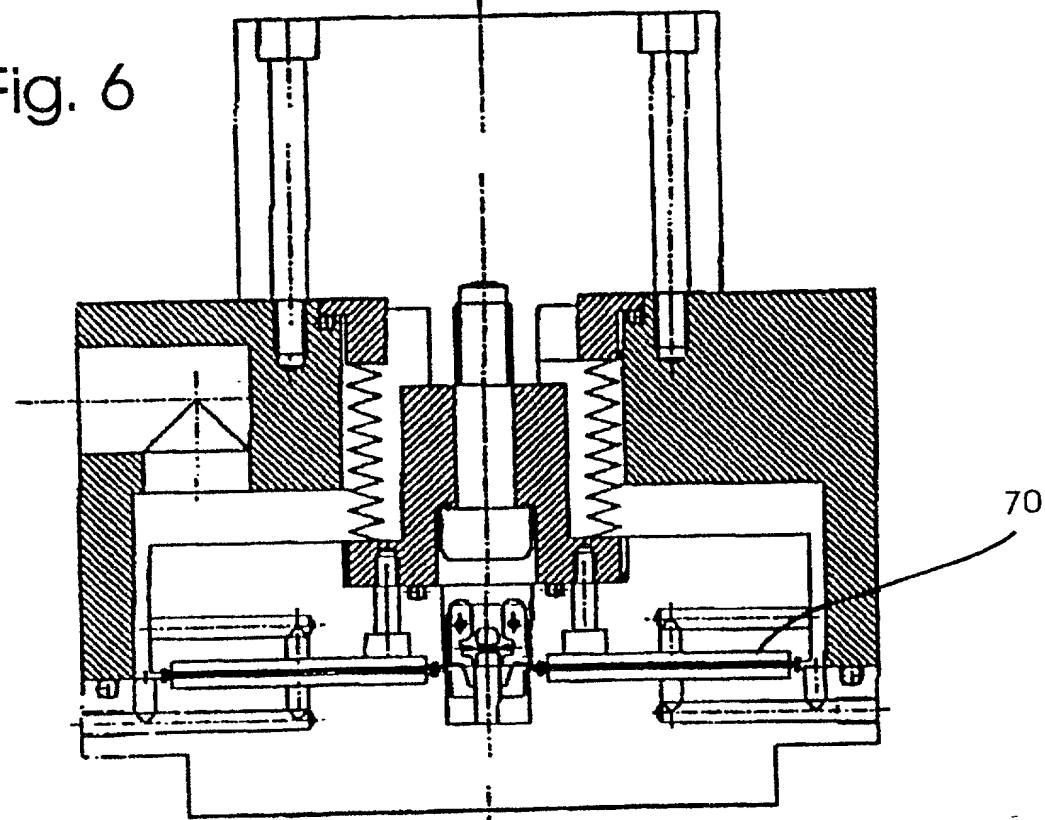
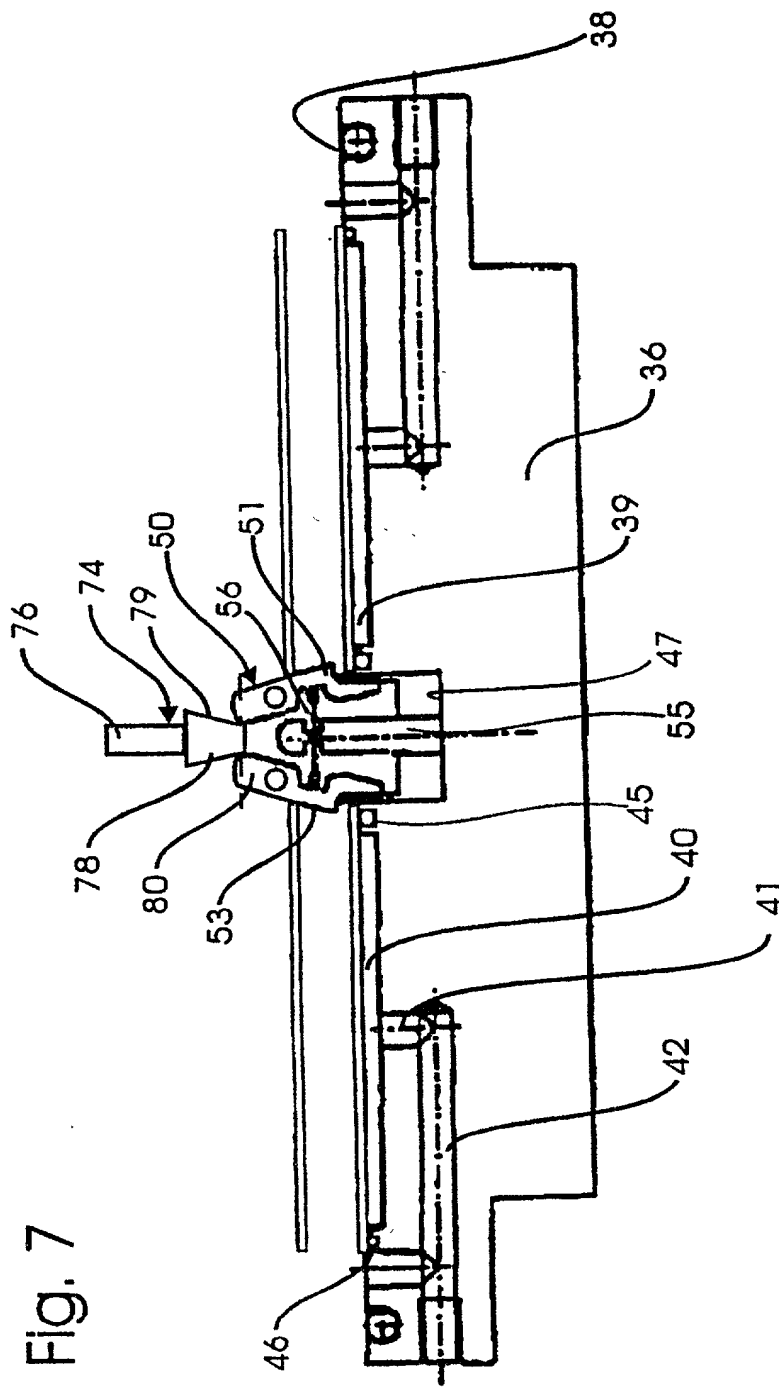




Fig. 7



COMBINED DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As below named inventors, we hereby declare that:

Our residences, post office addresses and citizenships are as stated below next to our names, we believe we are the original, first and joint inventors of the subject matter which is claimed and for which a patent is sought of the invention entitled:

APPARATUS FOR JOINING SUBSTRATES TOGETHER

the specification of which

\_\_\_\_\_ is attached hereto;  
XXX was filed on June 14 2000 as International Application Ser. No. PCT/EP00/05440  
and is amended herewith.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information known by me to be material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Applications			Priority Claimed:	
			Yes	No
199 27 514.9	Germany	16 June 2001	X	
(Number)	(Country)	(Day/Month/Year Filed)		

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below:

(Application Number)	(Filing Date)
----------------------	---------------

I hereby appoint attorney Robert W. Becker, Reg. No. 26 255, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith. Address all telephone calls to (505) 286-3511. Address all correspondence to ROBERT W. BECKER & ASSOCIATES, 11896 N. Highway 14, Suite B, Tijeras, New Mexico 87059

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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